



## ORIGINAL ARTICLE

# Effectiveness of patient empowerment over stress related to knee arthroplasty surgery



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Received 21 February 2017; accepted 4 September 2017

### KEYWORDS

Stress;  
Electrocardiography;  
Biomarkers;  
Arthroplasty;  
Replacement;  
Knee

### Abstract

**Objective:** This study aims to show evidence of the Empowerment Session's effectiveness through measurements of surgery related emotional stress before and after this session.

**Method:** The study was performed on 41 patients with knee arthroplasty surgery prescription by measuring the evolution of their emotional stress generated by surgery expectative, during the empowerment session. Two sets of measurements per patient were performed, before and after the empowerment session. Each set consisted of recording an electrocardiogram for 10 min while the patients were seated and then applying two standard psychometric tests: State-Trait Anxiety Inventory test and Visual Analog Stress test. Differences in emotional stress were analyzed using psychometric tests and heart rate variability (HRV) analysis as stress biomarkers.

**Results:** Psychometric stress measurement shows a 17.8% reduction in stress according to the total stress scale value, and a 41.9% reduction in stress between test results before and after the session. Mean heart rate values increased by 7.4% with respect to the initial values, very low frequency power and total power also change in value suggesting more sympathetic and less parasympathetic activity.

**Conclusions:** Both psychological and physiological measurements suggest the effectiveness of the empowerment session due to a significant increase in the wellness state of patients. Additionally, the correlation between psychometric tests and HRV indices demonstrates that both emotional stress indicators could be used as feedback on the empowerment sessions or as a reference to enhance surgical outcomes.

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**PALABRAS CLAVE**

Estrés;  
 Electrocardiografía;  
 Biomarcadores;  
 Artroplastia;  
 Reemplazo;  
 Rodilla

## Efectividad del empoderamiento del paciente sobre el estrés relacionado con la cirugía de artroplastia de rodilla

**Resumen**

**Objetivo:** Este estudio tiene como objetivo dar evidencias de la eficacia de la sesión de empoderamiento a través de mediciones del estrés emocional relacionado con la cirugía antes y después de esta sesión.

**Método:** El estudio se realizó en 41 pacientes con prescripción de cirugía de artroplastia de rodilla durante la sesión de empoderamiento. Se realizaron 2 conjuntos de medidas por paciente, antes y después de la sesión. Cada conjunto consistió en registrar el electrocardiograma durante 10 min mientras los pacientes estaban sentados y luego aplicando 2 test psicométricos estándar: test State-Trait Anxiety Inventory y escala análoga visual. Las diferencias en el estrés emocional se analizaron mediante test psicométricos y el análisis de la variabilidad del ritmo cardíaco (HRV) como biomarcadores de estrés.

**Resultados:** Los puntajes en los test psicométricos muestran una reducción del 17,8% en el estrés según el valor de la escala de estrés total, y una reducción del 41,9% en el estrés entre los resultados de las pruebas antes y después de la sesión. Los valores medios de ritmo cardíaco aumentaron un 7,4%. Las variaciones en la potencia ultra baja frecuencia y la potencia total sugieren una mayor actividad simpática y menor parasimpática.

**Conclusiones:** Tanto las mediciones psicológicas como fisiológicas sugieren la efectividad de la sesión de empoderamiento debido a un aumento significativo en el estado de bienestar de los pacientes. Además, la correlación entre las pruebas psicométricas y los índices de HRV demuestra que ambos indicadores de estrés emocional podrían utilizarse como retroalimentación en las sesiones de empoderamiento o como una referencia para mejorar los resultados quirúrgicos.

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**What is known?**

Modern-day surgery protocols include Patient Empowerment as a key factor to improve surgical recovery processes by enhancing the patient's mental state. Since 2011, the "Fast Track Prosthetic Knee Project" at the Hospital Clinic of Barcelona (Spain) has included a patient empowerment session prior to knee arthroplasty surgery. This session is designed to reduce emotional stress by providing information and tools helping patient to better face surgery and recovery.

**What it contributes?**

Differences in emotional stress before and after an empowerment session were analyzed using psychometric tests and Heart rate variability analysis as stress biomarkers. Both psychological and physiological measurements give support to the effectiveness of the empowerment session because the significant increase in the wellness state of patients. Additionally, the correlation found between psychometric tests and HRV indices demonstrates that, as is frequently assumed, HRV is associated with emotional stress state. Both emotional stress indicators could be used as feedback on the empowerment sessions or as a reference to enhance surgical outcomes.

**Introduction**

Surgery is undoubtedly a powerful source of stress for a patient, not only because of the diagnosis itself, but also due to the recommendation for immediate surgery, the time spent in the hospital, and the consequences of further surgery and recovery, which together will significantly influence surgical results in pain, function, and quality of life.<sup>1</sup> For patients, surgery and hospitalization may represent insecurity, a fear of not awakening from anesthesia, pain during the procedure and during recovery, the disclosure of personal information during anesthesia, disorientation and the loss of intimacy outside of their familiar environment, among others.<sup>2</sup>

There is medical evidence supporting the idea that, due to all these factors, surgery affects the mental condition and well-being of patients before surgery and during the recovery process.<sup>3</sup> Studies of pre-surgical stress have found two paths to overcome such situations. The psychological path seeks to relate features, strategies of confrontation. The medical path aims to inhibit the functional competence of the immune system in subjects that experience situations of pain of different intensity and duration.<sup>4</sup> The psychological path aims to improve patient wellness by reducing emotional stress, while the medical path tries to enhance physical stress. The two paths are not entirely different, and are in fact complementary.

Patient Empowerment is defined as the act of self-regulation, which may be induced in an educational session to promote individual potential, and maximize patient health and wellness.<sup>5</sup> Even though while some studies found

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